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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/685,400	10/16/2003	Hsuan-Huci Shih	ACR0088-US	7835
<div>7590 Michael D. Bednarek SHAWPITTMAN 1650 Tysons Boulevard McLean, VA 22102-4859</div>			<div>EXAMINER NEWAY, SAMUEL G</div>	
			<div>ART UNIT 2626</div>	<div>PAPER NUMBER</div>
			<div>MAIL DATE 05/08/2007</div>	<div>DELIVERY MODE PAPER</div>

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/685,400	SHIH, HSUAN-HUEI	
	<b>Examiner</b>	<b>Art Unit</b>	
	Samuel G. Neway	2626	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 16 October 2003.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-26 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-26 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 16 October 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>10/16/03</u> .  | 6) <input type="checkbox"/> Other: _____                          |

### **DETAILED ACTION**

1. This is responsive to the Application filed on 16 October 2003.

#### ***Claim Objections***

2. Claim 13 is objected to because of the following informalities: in line 2, "model that predict" is believed to be a typographical error. Appropriate correction is required.

#### ***Claim Rejections - 35 USC § 102***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1 – 12, and 17 – 26 are rejected under 35 U.S.C. 102(b) as being anticipated by Shih et al. ("An HMM-based Approach to Humming Transcription", IEEE International Conference on Multimedia and Expo, August 2002).

Claim 1:

Shih discloses a humming transcription system comprising:

an humming signal input interface accepting an input humming signal (Fig. 1 and related text);

and a humming transcription block that transcribes the input humming signal into a musical sequence (Fig. 1 and related text), wherein the humming transcription block includes a note segmentation stage that segments note symbols in the input humming

signal based on note models defined by a note model generator ("note in every utterance is detected ... ", section 2.4.4, lines 2-3), and a pitch tracking stage that determines the pitches of the note symbols in the input humming signal based on pitch models defined by a statistical model ("the mean pitch value of the note will be calculated ... ", section 2.4.4, lines 4-5).

Claim 2:

Shih discloses the humming transcription system of claim 1 further comprising a humming database recording a sequence of humming data provided to train the note models and the pitch models (Fig. 1 and related text).

Claim 3:

Shih discloses the humming transcription system of claim 1 wherein the note model generator is implemented by phone-level Hidden Markov Models with Gaussian Mixture Models (section 2.3).

Claim 4:

Shih discloses the humming transcription system of claim 3 wherein the phone-level Hidden Markov Models further comprising a silence model for preventing errors of segmenting the note symbols in the input humming signal caused by noises and signal distortions imposed on the input humming signal (section 2.4).

Claim 5:

Shih discloses the humming transcription system of claim 3 wherein the phone-level Hidden Markov Models define the note models based on a feature vector

associated with the characterization of the note symbols in the humming signal, and wherein the feature vector is extracted from the humming signal (section 2.3).

Claim 6:

Shih discloses the humming transcription system of claim 5 wherein the feature vector is constituted by at least one Mel-Frequency Cepstral Coefficient, an energy measure, and first-order derivatives and second-order derivatives thereof (section 2.2, lines 1-15) .

Claim 7:

Shih discloses the humming transcription system of claim 1 wherein the note segmentation stage further includes: a note decoder that recognizes each note symbol in the humming signal; and a duration model that detects the duration associated with each note symbol in the humming signal and labels the duration of each note symbol relative to a previous note symbol (section 2.1.2).

Claim 8:

Shih discloses the humming transcription system of claim 7 wherein the note decoder utilizes a Viterbi decoding algorithm to recognize each note symbol (section 2.4.2).

Claim 9:

Shih discloses the humming transcription system of claim 1 wherein the note model generator utilizes a maximum likelihood method with Baum-Welch re-estimation formula to train the note models (section 2.4, lines 1-3).

Claim 10:

Shih discloses the humming transcription system of claim 1 wherein the statistical model is implemented by a Gaussian Model (section 2.3).

Claim 11:

Shih discloses the humming transcription system of claim 1 wherein the pitch tracking stage further comprising a pitch detector that analyzes the pitch information of the input humming signal, extracts features used to characterize a melody contour of the input humming signal, and detects the relative pitch of the note symbols in the humming signal based on the pitch models (section 2.2).

Claim 12:

Shih discloses the humming transcription system of claim 11 wherein the pitch detector uses a short-time autocorrelation algorithm to analysis the pitch information of the input humming signal (section 2.2.3).

Claim 17:

Shih discloses the humming transcription system of claim 1 wherein the humming transcription system is arranged in a computing machine (Introduction).

Claim 18:

Shih discloses a humming transcription methodology comprising:

compiling a humming database recording a sequence of humming data; inputting a humming signal (Fig. 1 and related text);

segmenting the humming signal into note symbols according to note models defined by a note model generator ("note in every utterance is detected ... ", section 2.4.4, lines 2-3); and determining the pitch value of the note symbols based on pitch

models defined by a statistical model ("the mean pitch value of the note will be calculated ... ", section 2.4.4, lines 4-5).

Claims 19 – 26:

Claims 19 – 26 are similar in scope and content to claims 3 – 12 and are rejected with the same rationale.

***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 13 – 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shih et al. ("An HMM-based Approach to Humming Transcription", IEEE International Conference on Multimedia and Expo, August 2002) in view of Shih et al., ("Multidimensional Humming Transcription Using Hidden Markov Models for Query by Humming Systems", 02 May 2003, <http://web.archive.org/web/20030502190616/http://sail.usc.edu/publications/Shih-Narayanan-Kuo.pdf>) referred as Shih II hereinafter.

Claim 13:

Shih discloses the humming transcription system of claim 1 but he does not explicitly disclose a music language model that predicts the current note symbol based on previous note symbols in the musical sequence.

Shih II discloses a humming transcription system where a music language model that predicts the current note symbol based on previous note symbols in the musical sequence ("predict the next note of a music sequence ...", page 13, 2<sup>nd</sup> paragraph).

It would have been obvious to one with ordinary skill in the art at the time of the invention to use a music language model in Shih's system in order to "improve the probability of correct recognition of a note" (Shih II, page 13, 2<sup>nd</sup> paragraph).

Claims 14 – 16:

Shih and Shih II disclose the humming transcription system of claim 13, Shih II further discloses wherein the music language model includes a N-gram pitch and duration model that predicts the relative duration associated with the current note symbol based on relative durations associated with previous note symbols in the musical sequence, and predicts the relative pitch associated with the current note symbol based on relative pitches associated with previous note symbols in the musical sequence (Shih II, page 13, 2<sup>nd</sup> paragraph).

It would have been obvious to one with ordinary skill in the art at the time of the invention to use a music language model in Shih's system in order to "improve the probability of correct recognition of a note" (Shih II, page 13, 2<sup>nd</sup> paragraph).

### ***Conclusion***

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.




Durey et al. ("Melody Spotting using Hidden Markov Models", International Symposium on Music Information Retrieval, 2001, pp. 109-117) discloses using Hidden Markov Models to spot melody in music pieces.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Samuel G. Neway whose telephone number is 571-270-1058. The examiner can normally be reached on Monday - Friday 8:30AM - 5:30PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David R Hudspeth can be reached on 571-272-7843. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

SN



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